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13. ABSTRACT
Most practical dynamical systems are formulated by hybrid uncertain delayed systems that consist of mixed continuous and discrete uncertain subsystems with state and/or input delays. For improving the performance of the delayed hybrid systems, well-established control theory and design methods are available in the continuous-time domain to find analog controllers. The resulting analog controller is required to be replaced by a digital controller for better reliability lower cost, smaller size, more flexibility and better performance.
In this research, we have successfully accomplished the following research subjects: (1) Digital/analog model conversions of linear hybrid interval systems with unknown-but-bounded uncertain parameters; (2) Digital modeling and control of linear continuous-time systems with state, input and output delays; (3) Development of digital redesign techniques for digital control of cascaded linear hybrid interval systems; (4) Development of PAM (Pulse-Amplitude-Modulated) and PWM (Pulse-Width-Modulated) digital controllers for linear hybrid interval systems; (5) Design of digital PAM tracker for nominal chaotic orbits; (6) Interval Kalman filtering for linear stochastic uncertain systems; (7) Fuzzy-model-based self-tuning controller for nominal chaotic systems; (8) Model conversions and optimal control of 2D (2 Dimensional) nominal systems; (9) GA (Genetic Algorithm)-based optimal digital controllers for linear hybrid interval systems.

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Interval Method for Analysis and Design of Hybrid Uncertain Systems

(I) Summary of Research Results

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(III) Report of inventions

None